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**U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
DAIRY DIVISION.**

**THE MANUFACTURE OF COTTAGE CHEESE IN CREAMERIES
AND MILK PLANTS.**

Cottage cheese, properly made, offers a most palatable and nutritious article of food at a relatively low price compared to the cost and nutritive value of many other protein foods. The simple method of manufacture recommends its adoption by creameries and milk plants which desire to dispose of skim milk to good advantage.

Since the quality of cottage cheese is judged by flavor and texture, it is very important that the skim milk used be of good clean flavor and free from foreign odors. It is possible for the maker to control the texture of the cheese, but if the flavor also is to be controlled, good raw material is necessary.

PASTEURIZATION OF SKIM MILK IMPORTANT.

The fresh skim milk from the separator should be pasteurized and the process of manufacture begun as soon as possible thereafter, in order that the fermentation or souring process may be controlled to the best advantage. Perhaps the largest part of the cottage cheese used is made from raw skim milk, but the advantages to be derived from proper pasteurization are so great as to make it highly advisable to adopt this system of manufacture. Pasteurization adds but little extra expense to the cost of making and has the following important points in its favor:

1. It gives a sanitary, safe food product free from all danger of disease-producing bacteria.
2. It allows the use of a pure-culture starter to control the formation of the mild-acid curd, giving the characteristic sour-milk flavor so much desired.

Pasteurization requires but little additional work, provided suitable equipment is at hand. A temperature of 145° F., held for 30 minutes, gives an efficient pasteurization and does not affect the coagulability of the milk for making cottage cheese. The use of a starter, however, is necessary in order to obtain the desired flavor.

EQUIPMENT REQUIRED.

The extra equipment necessary in the manufacture of cottage cheese depends upon the apparatus on hand and whether the skim milk is to be pasteurized. If pasteurization is to be included in the process the following apparatus is needed for making cottage cheese:

1. Pasteurizing outfit.
2. Cheese vat.
3. Drain rack.
4. Drain cloths.
5. Curd knives, curd pail, and vat whey strainer.

METHOD OF MANUFACTURE.

RIPENING THE SKIM MILK.

The object of ripening is to obtain the characteristic, mild, sour-milk flavor and at the same time develop the required degree of acidity to cause a separation of the curd when the curdled milk is heated. The temperature used for ripening depends upon the quantity of starter added and how soon a firm coagulation is desired. The greater the quantity of starter and the higher the temperature the sooner the milk will curdle. A temperature above 75° F., however, is not desirable; usually 60° or 70° F. produces best results. Experience will show the right combination of starter and temperature to be used for best results under existing conditions. Raw milk allowed to sour naturally usually develops a well-flavored curd, but the chances of obtaining a fine-flavored product regularly are greatly increased by pasteurization and the use of a good starter. In case the starter is of poor quality it should not be used but natural souring should be depended upon instead. It is desired to separate the curd from the whey shortly after the milk shows a firm and smooth coagulation. At this stage sufficient acid is present to give a good, clear separation of the whey.

CUTTING AND HEATING THE CURD.

The best method of cutting the curd is to use regular cheese-curd knives. They give fairly uniform cubes of curd from which the whey can be expelled with small loss of finely broken curd passing through the drain cloth. To break the coagulated milk with a mechanical stirrer produces too many fine particles of curd which may be lost during drainage. Steam is turned on when the curd is cut, and the temperature is raised gradually. At frequent intervals the coagulum is gently stirred to insure a uniform temperature and to prevent undue cooking of the curd along the sides and bottom of the vat. The proper temperature required to give a good, clear separation can be readily ascertained by examination of the mixture in the vat. At this stage the whey should be clear or show very little cloudiness.

The texture of the cheese is controlled by temperature and time of heating the coagulum, and the extent to which the curd is drained. Considerable variation with regard to the temperature of heating and the time the curd is allowed to drain is therefore necessary. A temperature of from 90° to 105° F. gives the desired results for all normal conditions, and it is rarely necessary to exceed 100° F. Heating the coagulum to a higher temperature favors the more rapid expulsion of whey from the curd and produces a dry, coarse-grained cheese demanded by some markets. Continued heating at the temperature giving a clear separation of the curd and whey hastens the removal of whey and shortens the time of drainage. For making a smooth, uniform-textured cheese care must be taken not to heat the curd too long, especially at a high temperature, as such conditions tend to produce a dry, coarse-bodied cheese. A smooth, uniform-textured cheese brings out the fine flavor to the best advantage, as it has none of the harshness or grittiness found in the dry, coarse-grained product. The use of a high temperature shortens the time required for making, but much greater attention is necessary.

DRAINING THE CURD.

After the curd has been heated for from 20 minutes to an hour, depending upon conditions, the whey may be drawn from the bottom of the vat into the cloth-lined drain rack. The greater portion of the whey is drawn off through the vat whey strainer and passes quickly through the drain cloth. The mixture of curd and whey remaining is then placed in the drain rack, where drainage is completed. An occasional raising and lowering of the drain cloth hastens drainage. The extent of drainage depends upon the texture of cheese desired, the temperature and the length of time of heating. When a fairly low temperature is used, drainage can be readily controlled. It must continue until there is no accumulation of free whey in the finished cheese. A high temperature tends to give more free whey in the finished product, unless the curd is allowed to drain to such an extent that the yield is materially reduced; this also increases the probability of producing too dry a cheese. In case the curd is draining to an extent that the cheese will be too dry, it can be checked by washing with cold water.

SALTING.

Salt is sprinkled uniformly over the curd and well worked in with a paddle. The rate of salting depends upon the market demands. One and one-quarter pounds to 100 pounds of curd gives a medium-light salted cheese which is desired by most consumers. Light salting gives the consumers more opportunity to prepare the cheese to suit their individual tastes.

The addition of 1 pound of sweet cream to 10 of curd adds greatly to the palatability of the cheese. The cream can be worked into the curd together with the salt.

PACKING AND MARKETING.

The ideal method of marketing is in the sanitary, single-service, paraffined paper containers, which are convenient for the dealer to handle and are attractive to the buyer. Cheese shipped in bulk may be packed in butter tubs or in ordinary milk-shipping cans. To insure marketing in the best condition, the cheese, immediately after it is made, should be placed in the refrigerator and held at low temperature until marketed. Fresh-made cottage cheese should not be shipped until after it has been well cooled, for warm cheese favors the quick development of fermentation and deterioration in quality.

YIELD OF CHEESE.

The yield of cheese varies from 12 to 22 pounds per 100 pounds of milk and depends almost entirely upon the amount of moisture left in the curd, which in turn is controlled by the method of manufacture. The factors which influence the percentage of moisture in the curd and determine the yield are—

1. Temperature and length of time of heating curdled milk.
2. Extent of drainage.
3. Condition of milk.

The moisture in the curd can be fairly well controlled by the extent of drainage, provided too high a temperature has not been used for heating and the time of heating has not been excessive. The physical condition of the milk often has a marked influence upon the resulting yield. A weak, unevenly coagulated curd, when cut, makes a large quantity of fine curd, much of which may be lost in drainage.

An ideal quality of cheese, which brings out the delicate, mild flavor to the best advantage, is rather firm, smooth, and yields from 15 to 20 pounds to 100 pounds of milk.